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Effective Use of Slaughter Checks for Identification and Control of Swine Disease[b]

Swine producers, individually and as an industry are faced with numerous and complicated challenges. It is a dynamic industry. One area of interaction within the infrastructure is that of animal health. There are many diseases known to affect swine and their production efficiencies. These diseases impact producers and the industry in numerous interrelated ways. Severe animal disease can cause producers to dramatically limit or even halt production [1]. Disease can be clinical or subclinical. Clinical disease is easily observable and actions can be taken to reduce its level. However, many swine diseases are subclinical and are not visually observable. For subclinical disease, detection and accurate diagnoses in the live animal can be difficult. Yet these diseases can result in significant reductions in animal efficiency and producer losses [2].

Decreased animal production efficiency causes higher production costs and ultimately, higher consumer prices. Producers, in the interest of remaining competitive and low cost producers often use medicated feed additives as a strategy to increase animal efficiency and combat potential subclinical disease. These practices can also reduce the likelihood of a major disease outbreak. Medication may be viewed as inexpensive insurance which reduces the chance of disease entering the herd. None-the-less, pork producers cannot ignore consumer perceptions of such practices and associated potential food residues. Consumers are becoming more conscientious of food safety and the availability of wholesome

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food products. The industry must address these issues.

A potential method of gaining insight into animal morbidity levels is use of slaughter checks. A recent study investigated slaughter checks as a management practice to identify levels and severity of selected swine diseases. In a slaughter check a veterinarian examines the internal tissues and organs of an animal and the carcass as it moves through a slaughter plant. Such examinations can be used to determine the presence of and level of disease in the herd. Through observation of internal organs, identification of subclinical disease is possible. Information from a representative slaughter check would allow a producer to better assess disease risks and make more informed decisions with respect to herd health management. This tool may reduce the need for such practices as continuous use of therapeutics as an animal health preventive strategy. Periodic slaughter checks may provide very timely information on disease levels within the herd. Potential for corrective rather than preventive actions may become more feasible.

Twenty-one Central Missouri swine producers who regularly marketed hogs to a local slaughter plant participated in the study. Three slaughter checks were conducted for each farm, approximately six months apart, beginning in the winter (February) of 1986. In the slaughter checks, observations were made with respect to pneumonia, rhinitis, pleuritis, pericarditis, parasites, and arthritic joints. Objectives of the study included determining the overall level of subclinical disease in the sample herds, investigating the behavior of disease levels with respect to production season as well as farrowing and finishing facilities employed, and estimating the economic impact of pneumonia and atrophic rhinitis.

Results

Due to obvious space limitations, the following results focus on level of atrophic rhinitis and pneumonia and resulting economic losses. Of the diseases observed, these occurred with the highest frequency. The average level of pneumonia and rhinitis observed in all seasons is presented in Table 1. Pneumonia observations reflect the average percent of lung surface area affected by pneumonic lesions and exhibit a distinct seasonal behavior. In the first winter round of checks the average pneumonia level was 4.76 percent of lung area affected. The pneumonia level dropped considerably, to 2.9 percent, in the following summer only to rise to an average of 4.40 percent in the final winter check. Rhinitis was measured on a 0 to 5 scale with 0 indicating a normal snout. Like pneumonia, rhinitis scores also exhibited seasonal fluctuations. An average score of .87 was observed in the first winter check but nearly doubled for the summer check (1.73). The average snout score in the final winter check of .89 was virtually identical to that of the previous winter. When evaluating the seasonal variation, it is important to consider the growth process of the hog and that observations were made when the hogs were slaughtered. Hogs slaughtered in the winter would have been placed on feed the previous summer and vice versa. Thus, results may reflect, in part, the seasonal influence of the farrowing-nursery phase as well as the grow-finishing phase.

Producers supplied substantial background information on all hogs slaughter checked. Types of farrowing and finishing facilities employed by the producers was included. Possible relationships between disease and production facilities are reported in Tables 2 through 4. A comparison of pneumonia and rhinitis levels of hogs farrowed in individual huts versus a central house are presented in Table 2. Again, hogs slaughter checked in the winter would have been farrowed in the summer and vice versa. In both winter slaughter checks, the lowest levels of pneumonia and rhinitis, on average, were observed in hogs farrowed in individual huts. Pneumonia levels observed in hogs slaughter checked in the summer (farrowed in winter) were slightly lower for hogs farrowed in a central house (2.62%) as opposed to those from individual huts (2.85%). However, rhinitis levels in hogs slaughter checked in the summer were still lower for hogs farrowed in individual huts.

Pneumonia levels observed in hogs raised on four types of finishing facilities are presented in Table 3. The four facility types are as follows: dirt lots; total confinement; modified open fronts which were predominantly Nebraska type design; and open fronts, the majority being Cargill-Nutrena designs. In the first winter check, hogs finished on dirt lots exhibited the highest level of pneumonia (6.4%) while those raised in total confinement had the lowest (4.04%). In the summer slaughter check, hogs finished on open front facilities had a pneumonia level of 3.41 percent of the lung area affected which was highest among the four types. In the final winter check, the highest level of pneumonia was observed in hogs finished in modified open front facilities. Dirt lots exhibited a high degree of variability ranging from the highest during one season to the lowest during another. This should not be surprising as this system is highly impacted by weather conditions. During adverse weather conditions top level management is needed to effectively combat disease in these systems. They are not as tolerant as weather can magnify management errors. At the same time, these systems can withstand greater disease variability as the financial risks are usually less due to lower capital investments.

Another important aspect is the level of variability within production systems. This is provided by the standard deviation values. These were high for most systems. The standard deviation is influenced by two forces, the within herd variability and between herds variability. These factors were not sorted out in this study. While variability was high for all systems, dirt lots consistently had the highest variability relative to the mean.

Rhinitis levels by finishing facility is presented in Table 4. Hogs finished in total confinement had considerably higher levels of rhinitis in the Winter 1986 and Summer 1986 checks. In all three seasonal checks, hogs finished on dirt lots exhibited consistently lower levels of rhinitis relative to the other facility types. Except for hogs finished in modified open front facilities, percentage increases and decreases in seasonal rhinitis levels for the different facility types were quite similar.

Economic Analysis

Numerous studies have indicated that pneumonia and rhinitis, even subclinical levels, can cause significant decreases in average daily gain and feed efficiency. At some point, decreasing animal production efficiency will lead to decreases in economic efficiency. For the hogs slaughter checked, animal performance was calculated based on production data provided by cooperating producers. The impact of rhinitis and pneumonia was calculated as the difference between economic performance with disease and performance which could have been obtained with a disease level that would not affect animal production efficiency [3]. Decreases in average daily gain associated with the observed levels of pneumonia and rhinitis were based on estimates prepared by McKean et al.

The economic impact of decreases in average daily gain (ADG) were evaluated under two scenarios. The first evaluated the increase in production costs due to disease and assumed that a producer was finishing a single batch of hogs.

This would be similar to a pasture production system. The implication of this assumption is that the producer is not trying to move several groups of hogs through a facility in a given time period. In this situation a reduction in ADG, given a constant amount of gain and constant hog price, results in an increase number of days on feed but equal revenue received at a later time. The second situation assumes that a producer maximizes profit over a specific time period by moving hogs through a fixed production space. This would be a continuous production system when one group is sold another is bought in its place. In this scenario, reduced ADG leads to increased production costs due to increased days on feed and increased feed requirements. Additionally, the revenues will decline as pork production declines for the specified time period.

Results for the observed pneumonia levels are presented in Table 5. In the Winter 1986 check the average effect on ADG due to pneumonia was a negative 3.4 percent. For that check, the average increased production cost per hog was $1.31. When evaluated in a continuous production scenario, this average decrease in ADG would result in a decreased profit per production space per year of $6.94. In the summer check, the effects of pneumonia on production costs and profit per space decreased as pneumonia levels decreased. It was $4.38 per space capacity. The last line of Table 5 presents a weighted average of the two winter and one summer check and reflects this seasonality. The annual average decrease in ADG was 2.83 percent. The annualized effect of pneumonia on production costs was an increase of $1.09 per hog or $5.30 per production space per year. A facility with a capacity of 500 head would have annual losses of $2,650.

Results for the observed rhinitis (AR) levels are presented in Table 6. The seasonal variation exhibited for AR was opposite that of pneumonia. The average reduction in ADG due to rhinitis in the Winter 1986 check was 1.4 percent as compared to 3.6 percent for the summer checked hogs. The winter 1986 reduction in ADG led to a per hog production cost increase of $0.54. For the summer checked hogs, the increased production costs per hog was $1.37. The annual average decrease in ADG due to rhinitis was 2.5 percent. Thus given the seasonality of rhinitis, on average, production costs per hog would be increased by $0.95 or a decrease profit per space per year of $4.75. For a 500 head facility reduced profit is $2,375 per year per system.

Summary and Conclusions

Animal disease information obtained through a slaughter check can be a valuable management tool. It provides information for more informed decision with respect to disease control and existing losses from disease. Slaughter checks can be effectively used to identify level and severity of subclinical disease. It can provide valuable information on clinical disease as well. By monitoring disease, producers improve information they have available for maintaining animal health and thus improve production efficiency. Producers can also benefit on the direct cost side as well. In some cases, expenses incurred in disease prevention and/or control can be considerable. Without information on disease levels in the herd, producers can incur unnecessary expenses for control of a disease which is not a problem in the herd. Knowledge of disease levels can enable producers to improve disease management and possibly reduce levels of medication.

A disease monitoring system which incorporates effective use of slaughter checks offers the potential result of healthier animals produced with lower levels of medication. It would incorporate disease monitoring as part of the health management strategies. This offers the possibility of reduced levels of medications for disease prevention as the method of disease control. It opens up the option of monitoring disease levels with corrective actions taken when necessary.

The swine industry would benefit from such a program. Reduced level of disease would lead to improved production efficiencies. Reduced disease would also lead to reduced producer and/or packer-processor harm from farm originated infections. Reduced levels of compound use may expand meat product demand due to greater confidence in the product as a more "wholesome" product. Residues showing up in the food chain would also be reduced. Reduced animal disease levels would offer the potential for reduced government regulatory functions. Risks of sudden changes in product supply too would be lessened. Food safety would be improved through improvement of on farm disease management strategies.

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Table 1. Average levels of pneumonia and rhinitis, all seasons[1]

Season	No. of Hogs checked	Average level	Standard deviation
	Pneumonia		
Winter 1986	776	4.76%	8.16
Summer 1986	658	2.78%	5.55
Winter 1987	668	4.40%	6.91
	Rhinitis		
Winter 1986	618	.87	1.18
Summer 1986	571	1.73	1.49
Winter 1987	604	.89	1.06

[1]Pneumonia levels indicate percent of lung surface area affected by pneumonic lesions. Rhinitis scores (0-5, 0=normal) based on mm space between nasal turbinates and base of nasal cavity.

Table 2. Average levels of pneumonia and rhinitis by farrowing facility, all seasons[1]

Variable	Number of hogs	Average[2] level	Standard deviation
	Winter 1986		
Individual huts			
Pneumonia	237	3.93%*	7.72
Rhinitis	213	.80	1.09
Central house			
Pneumonia	513	4.93%	7.99
Rhinitis	379	.92	1.24
	Summer 1986		
Individual huts			
Pneumonia	230	2.85%	5.89
Rhinitis	202	1.36*	1.25
Central house			
Pneumonia	400	2.62%	5.29
Rhinitis	345	2.01	1.55
	Winter 1987		
Individual Huts			
Pneumonia	195	3.52%*	6.74
Rhinitis	180	.54*	0.78
Central House			
Pneumonia	444	4.68%	6.92
Rhinitis	397	1.07	1.14

[1]Pneumonia levels indicate percent of lung surface area affected by pneumonic lesions. Rhinitis scores (0-5, 0=normal) based on mm space between nasal turbinates and base of nasal cavity.

[2]An asterisk by a given mean indicates a significant difference (p=.05) exists between relative frequencies of pneumonia levels or rhinitis scores in the facility type sample populations in that season.

Table 3. Average pneumonia level by finishing facility all Seasons[1]

Facility	Number of hogs	Average[2] level	Standard deviation
		Winter 1986	
a. Dirt lots	96	6.40%[b]	10.20
b. Total confinement	311	4.04%[a,d]	6.32
c. Modified open front	107	5.45%[d]	8.08
d. Open front	262	4.75%[b,c]	9.18
		Summer 1986	
a. Dirt lots	104	1.92%[d]	5.32
b. Total confinement	203	2.74%	5.42
c. Modified open front	124	2.43%	4.55
d. Open front	227	3.41%[a]	6.19
		Winter 1987	
a. Dirt lots	47	2.31%[b,c,d]	4.10
b. Total confinement	233	4.79%[a,c]	7.05
c. Modified open front	131	5.62%[a,b,d]	7.01
d. Open front	257	3.80%[a,c]	7.02

[1]Pneumonia levels indicate percent of lung surface area affected by pneumonic lesions.

[2]Facility types are labeled a,b,c, and d. The same letters are used in superscript to indicate a significant difference (p=.05) between relative frequencies of pneumonia levels in the respective facility type sample populations. For example, a superscript "a" on mean "b" denotes a significant difference in frequencies of pneumonia levels in hogs from dirt lots and total confinement.

Table 4. Average rhinitis level by finishing facility all seasons[1]

Facility	Number of hogs	Average[2] level	Standard deviation
	Winter 1986		
a. Dirt lots	83	$.62^{b}$	1.02
b. Total confinement	237	$1.24^{a,c,d}$	1.39
c. Modified open front	82	$.66^{b}$	0.97
d. Open front	216	$.65^{b}$	0.95
	Summer 1986		
a. Dirt lots	98	$1.16^{b,d}$	1.10
b. Total confinement	172	$2.54^{a,c,d}$	1.52
c. Modified open front	112	$1.17^{b,d}$	1.33
d. Open front	189	$1.61^{a,b,c}$	1.40
	Winter 1987		
a. Dirt lots	45	.66	0.81
b. Total confinement	215	1.00	1.12
c. Modified open front	120	1.17^{d}	1.32
d. Open front	224	$.67^{c}$	0.82

[1]Rhinitis scores (0-5, 0=normal) based on mm space between nasal turbinates and base of nasal cavity.

[2]Facility types are labeled a,b,c, and d. The same letters are used in superscript to indicate a significant difference (p=.05) between relative frequencies of rhinitis scores in the respective facility type sample populations. For example, a superscript "a" on mean "b" denotes a significant difference in frequencies of rhinitis scores in hogs from dirt lots and total confinement.

Table 5. Economic analysis of pneumonia levels

Slaughter check season	Average pneumonia level[2]	Average pneumonia effect on ADG[3]	Increased cost per hog	Annual decreased profit per space
Winter 1986	4.76%	-3.4%	$1.31	$6.94
Summer 1986	2.78%	-2.3%	$0.89	$4.38
Winter 1987	4.40%	-2.83%	$1.26	$5.48
Annual weighted average	3.68%	-2.83%	$1.09	$5.30

[1]Costs based on Missouri Farm Planning Handbook Swine Enterprise Budget (UMC Ext. Pub. #8160), hog price = $48.00/cwt, corn price = $2.63/bushel-Ag Prices, 1981-1986 average.
[2]Pneumonia levels indicate percent of lung surface area affected by pneumonic lesions.
[3]Average daily gain.

Table 6. Economic analysis of rhinitis

Slaughter check season	Average rhinitis score[2]	Average rhinitis effect on ADG[3]	Increased cost per hog	Annual decreased profit per space
Winter 1986	.87	-1.4%	$0.54	$2.55
Summer 1986	1.73	-3.6%	$1.37	$6.94
Winter 1987	.89	-1.3%	$0.50	$2.54
Annual weighted average	1.31	-2.5%	$0.95	$4.75

[1]Costs based on Missouri Farm Planning Handbook Swine Enterprise budget (UMC Ext. Pub. #8160), hog price = $48.00/cwt, corn price = $2.63/bushel-Ag Prices, 1981-1986 average.

[2]Rhinitis scores (0-5, 0=normal) based on mm space between nasal turbinates and base of nasal cavity.

[3]Average daily gain.